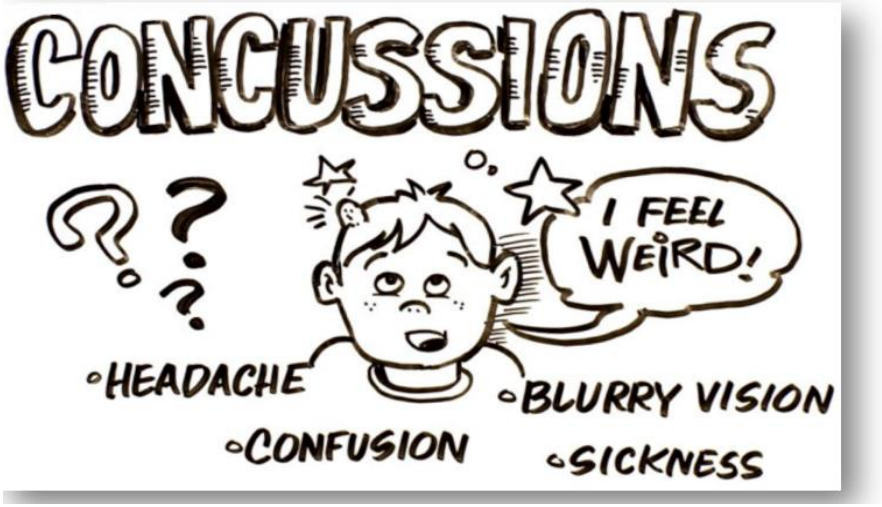
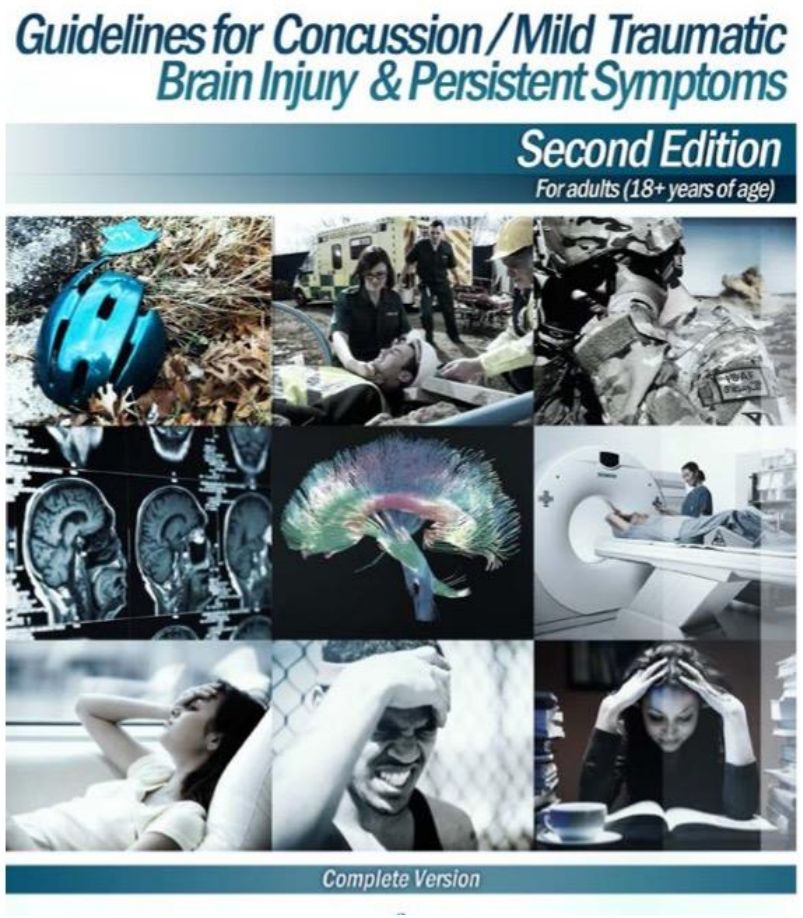
Guidelines for Diagnosing and Managing Pediatric Concussion

First edition, June 2014, v1.1





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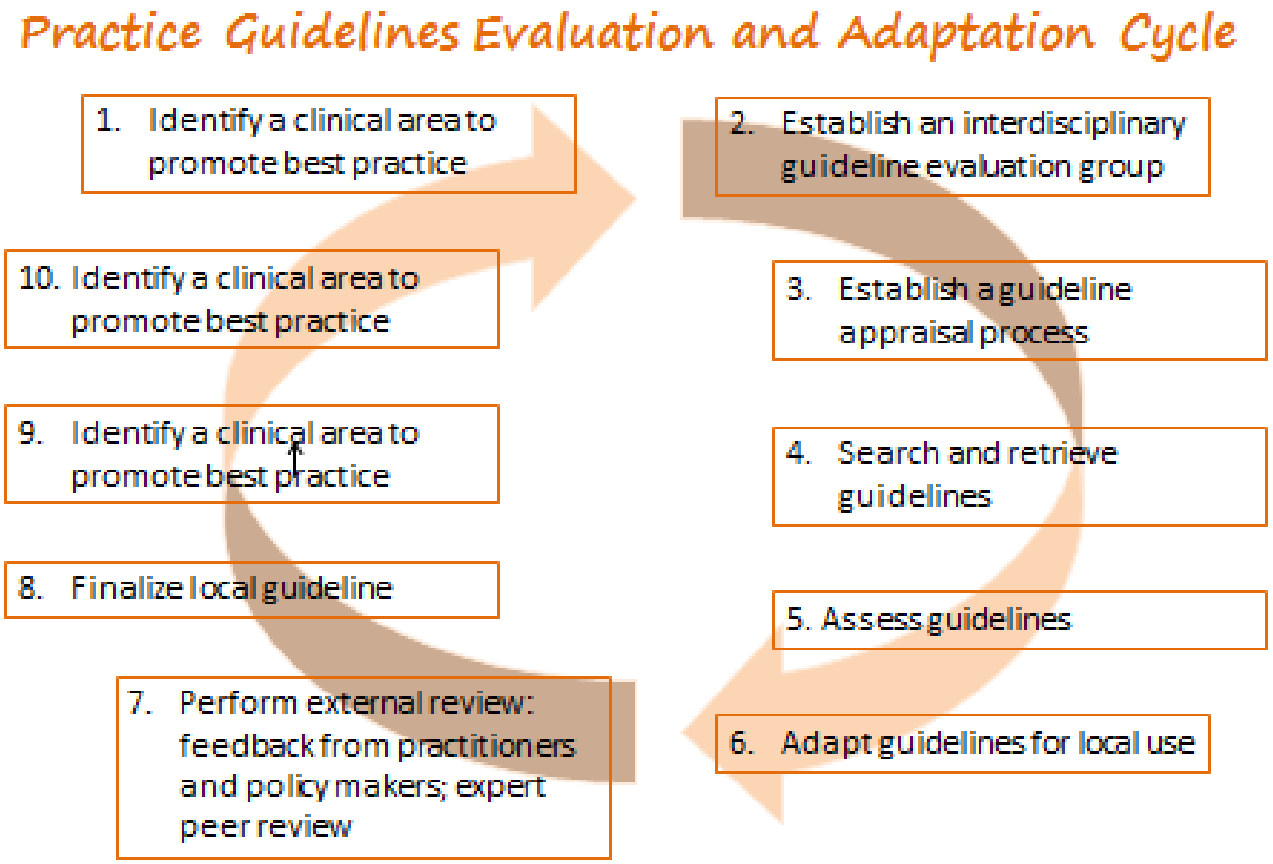
ONF Guidelines for Pediatric Concussion

Guideline Model



Adapted from Graham ID, Harrison MB. Evaluation and adaptation of clinical practice guidelines. *Evidence Based Nursing*. 2005;8(3):68-72. Reproduced with permission from BMJ Publishing Group Ltd.

ONF Guidelines for Pediatric Concussion

1. Recommendations for Health Care Professionals
2. Recommendations for Schools and/or Community Sports Organizations/Centres
3. Recommendations for Parents and/or Caregivers

http://onf.org/documents/guidelines-for-pediatric-concussion

Tipsheet/Recommendations for Health Care Professionals

In Advance (before the first activity)

Number		Evidence
0.4	Consider baseline neuro-cognitive testing if the child/adolescent plays high-risk sports—not as a general rule.	B

On Presentation (what are the "red flags"?)

Number		Evidence
2.1	Assess and treat any physical, cognitive and neurological deficits.	A/B
2.2	Determine the need for CT imaging.	A
2.3	Consider admission or prolonged observation if the child/adolescent shows "red flag" symptoms.	B
2.4	Treat acute headaches.	C
2.5	Prescribe physical and cognitive rest.	B/C
2.6	Discharge the child/adolescent for observation at home under certain conditions.	B

2.1: Assess and treat any physical, cognitive and neurological deficits.

When: On presentation.

Who: Health care professionals.

- Example: Emergency Department physicians, family physicians, pediatricians, sport medicine physician, nurse-practitioners.

How:

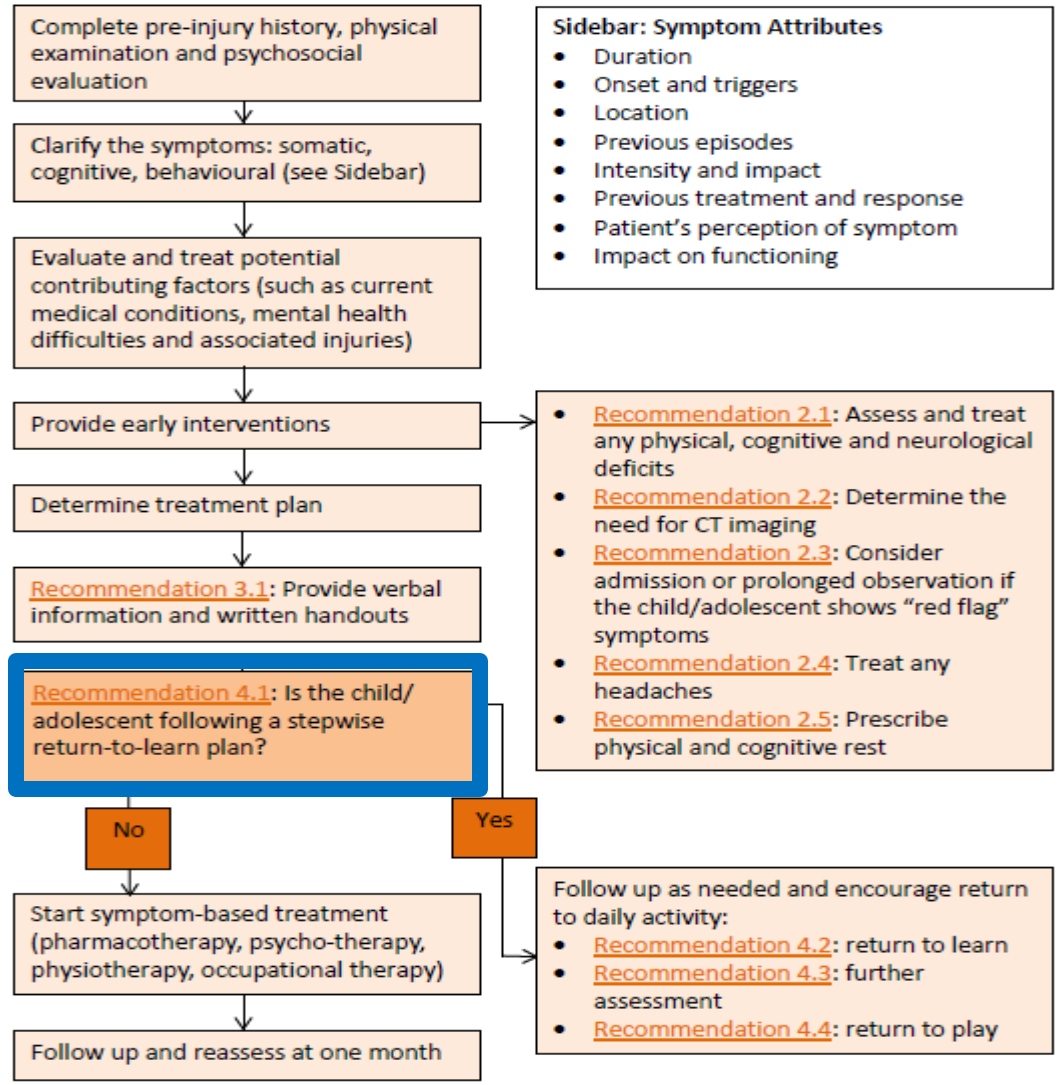
- Take a history; do an examination and a cognitive screen, assess for persistent symptoms; review mental health. Use the following tools as appropriate.
  - Tool 2.1: Management of Acute Symptoms Algorithm.
  - Tool 2.2: Acute Concussion Evaluation (ACE).
  - Tool 0.2: ChildSCAT3 Sport Concussion Assessment Tool for Children aged 5-12 (symptom evaluation).
  - Tool 1.1: SCAT3 Sport Concussion Assessment Tool for Athletes aged 13+ (symptom evaluation).
  - Tool 2.4: Neurologic and Musculoskeletal Exam.
- Consider signs and symptoms in context with the child/adolescent's normal performance, especially for those with learning and communication deficits, ADHD and/or physical disabilities.
- Find out if the child/adolescent plays high-risk sports and has had baseline neuro-cognitive testing (Recommendation 0.4 for parents and/or caregivers.)
- Recommendation 5.1: Assess any modifiers that may delay recovery.

Why:

- To start treatment immediately or decide on further tests.
- To prevent re-injury, the worsening of symptoms or a prolonged recovery.

Level of evidence: A for assess (ages 13+); B for treat.

Tool 2.1: Management of Acute Symptoms Algorithm



Adapted from Department of Veterans Affairs, Department of Defense. VA/DoD clinical practice guideline for management of concussion/mild traumatic brain injury (mTBI). Washington (DC): Department of Veteran Affairs, Department of Defense; 2009 Apr. 112 p.

4.1: Recommend that the child/adolescent follow a stepwise return-to-learn plan.

When: On interim evaluation.

Who:

- Health care professionals.
    - Example: Family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.

How:

- Note that there is evidence stating the need for physical and cognitive rest, but no clear answer as to the ideal duration. Extreme prolonged rest may delay recovery. Therefore, we offer tools for two approaches. Tools followed by "a" reflect a standard approach, those followed by "b" reflect a more conservative approach. Use clinical judgment.
    - Tool 0.5a: ACE Post-Concussion Gradual Return to School.
    - Tool 0.5b: CanChild Return to School Guidelines for Children and Youth.
- Consider the following:
    - Within 72 hours of injury:
        - Recommendation 2.5: Prescribe physical and cognitive rest.
        - If symptom-free, recommend that the child/adolescent returns to academic and/or school related activities gradually, as tolerated and as long as symptoms do not reoccur.
        - If symptomatic, recommend that the child/adolescent does not attend school or participate in school-related activities at home.
    - 3-6 days after injury:
        - If symptom-free, recommend that the child/adolescent returns to academic and/or school related activities gradually, as tolerated and as long as symptoms do not reoccur.
        - If symptoms are improving but worsen with cognitive activity, recommend that the child/adolescent does not attend school and/or participate in school-related activities.
    - One week or more after injury:
        - If still symptomatic, develop individualized return-to-learn accommodations with gradually increasing course load and hours of

Initial Diagnosis/Assessment of mTBI*

Initial GCS 14-15 on arrival following blunt head trauma

Stabilise ABCDEs and assess clinical risk factors.

Commence minimum of hourly clinical observations of vital signs, GCS, pupils, PTA and clinical symptoms

Low risk mild head injury

No indication for CT scan if all of...

- GCS 15 at 2 hours post injury.
- No focal neurological deficit.
- No clinical suspicion of skull fracture.
- No vomiting
- No known coagulopathy or bleeding disorder.
- Age <65 years.
- No seizure
- Brief loss of consciousness (<5 mins).
- Brief post traumatic amnesia (<30 mins)
- No severe headache.
- No large scalp haematoma or laceration
- Isolated head injury
- No dangerous mechanism.
- No known neurosurgery / neurological impairment.
- No delayed presentation or representation

NOTE:
Mild acute clinical symptoms such as lethargy, nausea, dizziness, mild headache, mild behavioural change, amnesia for event and mild disorientation are common and are not associated with increased risk of intracranial injury. These clinical symptoms usually start to improve within 2 to 4 hours of time of injury.

Continue minimum of hourly clinical observations until at least four hours post time of injury.

Clinically deteriorates or clinical symptoms not improving during observation period

Normal CT Scan

Clinical symptoms IMPROVING or remain normal during period of

Clinical symptoms IMPROVING at 4-6 hours post time of injury.

Clinical symptoms NOT IMPROVING at 4-6 hours post time of injury.

Clinically safe for discharge for home observation if:

- GCS 15/15
- No persistent post traumatic amnesia (nb A-WPTAS 18/18)
- Alertness / behaviour / cognition returning to normal
- Clinically improving after observation.
- Normal CT scan or no indication for CT scan.
- Clinical judgment required regarding discharge and follow up of elderly patients or patients with known coagulopathy or bleeding disorder due to increased risk of delayed subdural haematoma.

Clinically safe for discharge for home observation if:

- Responsible person available to take home and observe.
- Able to return if deteriorates.
- Discharge advice is understood.

Discharge for home observation if above criteria met:

- Provide written patient advice sheet
- Provide discharge summary for GP
- All patients should be advised to see their GP for follow up if they are not feeling back to normal within 2 days
- Any patients who have minor CT abnormalities, who suffered significant clinical symptoms or who had prolonged post traumatic amnesia should be routinely referred to their GP for follow up due to an increased risk of post concussion symptoms.

High risk mild head injury

Strong indication for CT scan if...

- GCS <15 at 2 hours post injury. #1
- Deterioration in GCS.
- Focal neurological deficit.
- Clinical suspicion of skull fracture #2
- Vomiting (especially if recurrent) #3
- Known coagulopathy or bleeding disorder #4
- Age >65 years. #5
- Seizure #6
- Prolonged loss of consciousness (>5 mins).
- Persistent post traumatic amnesia (A-WPTAS <18/18 at 4hrs post injury) #7
- Persistent abnormal alertness / behaviour / cognition #8
- Persistent severe headache.

Relative indication for CT scan if...

- Large scalp haematoma or laceration #9
- Multi-system trauma. #10
- Dangerous mechanism. #11
- Known neurosurgery / neurological impairment. #12
- Delayed presentation or representation. #13

Note
The presence of multiple risk factors is more concerning than a single isolated risk factor. In most uncomplicated mild head injury patients clinical symptoms start to improve by 2 hours post injury and are returning to normal by 4 hours post injury. Clinical symptoms that are deteriorating or not improving by 4 hours post injury on serial observation such as abnormal alertness / behaviour / cognition, PTA, vomiting or severe headache are very concerning.

Indication for CT scan. Continue clinical observations.

Abnormal CT scan

CT scan unavailable

Consider transfer for CT scanning particularly if:

- Persistent GCS <15.
- Deterioration in GCS.
- Focal neurological deficit.
- Clinical suspicion of skull fracture
- Known coagulopathy (esp if INR>4)
- Persistent abnormal alertness, behaviour,cognition, PTA, vomiting or severe headache at 4 hours post injury

Consult senior clinician and network neurosurgical service regarding further management and disposition. Continue clinical observations in hospital.

Explanatory notes for risk factors

1. Using GCS<15 at 2 hours post injury allows clinical judgement for patients who present soon after injury or who have drug or alcohol intoxication. Drug or alcohol intoxication has not been shown to be an independant risk factor for intracranial injury but persistent GCS<15 is a major risk factor and mandates CT.
2. Clinical suspicion of skull fracture includes history of focal blunt assault or injury; palpable skull fracture; large scalp haematoma or laceration; signs of base of skull fracture – haemotympanum / CSF leak / raccoon eyes / Battles sign.
3. Recurrent vomiting more concerning than isolated vomiting but both are indications.
4. Known coagulopathy is both a strong indication for early CT scan and to check the INR. Early reversal of anticoagulation if abnormal CT scan and consider reversal if initially normal CT scan with high INR (>4) depending on clinical situation.
5. Elderly patients have increasing risk of intracranial injury with increasing age; routine CT scanning indicated unless totally asymptomatic patient with no other risk factors.
6. Brief generalised seizures immediately following head injury are not significant risk factors. Prolonged, focal or delayed seizures are risk factors for intracranial injury.
7. Post traumatic amnesia may manifest as repetitive questioning or short term memory deficits and can be objectively tested using the A-WPTAS. PTA > 30 mins is a minor risk factor and PTA > 4 hours a major risk factor for intracranial injury.
8. Abnormal alertness/behaviour/cognition detects subtle brain injury better than GCS and should be part of the bedside assessment. Family may help establish what is normal.
9. Multi-system trauma – beware patient with unstable vital signs or distracting injuries or who receive analgesia or anaesthesia, as significant head injury is easily missed.
10. Clinical judgement required as to what is a large scalp haematoma or laceration.
11. Dangerous - MVA ejection / rollover; pedestrians / cyclists hit by vehicle; falls >own height or five stairs; falls from horses / cycles etc; focal blunt trauma, eg bat / ball / club.
12. Known neurosurgery/neurological impairment – conditions such as hydrocephalus with shunt or AVM or tumour or cognitive impairment such as dementia make clinical assessment less reliable and may increase risk of intracranial injury.
13. Delayed presentation should be considered as failure to clinically improve during observation. For representation consider both intracranial injury and post concussion symptoms and have a low threshold for CT scanning if not done initially.

Assessment and Management of Persistent Sleep/Wake Disturbances Following mTBI

Assessment

Every person with mTBI who has identified sleep problems should be screened for sleep/wake disturbances (Appendix 7.2 and 7.3), such as insomnia or excessive daytime sleepiness.

Screen for medical conditions, current medication use, co-morbid psychopathology, and risk factors for sleep disturbances (Table 7.1).

All patients with persistent sleep/wake complaints should be placed on a sleep hygiene program (Appendix 7.4) in addition to other interventions.

Sidebar 1: Medications

Potential Medication Options – *short-term basis only*

1. Trazodone
2. Mirtazapine
3. Tricyclic antidepressants (amitryptyline)
4. Quetiaptine

Avoid benzodiazepines

Note: Non-benzodiazapine medications (zopiclone, eszopiclone) may have fewer adverse side-effects.

Pharmacological Treatment

If medications are to be used, ensure they do not produce dependency and that they have minimal adverse effects for mTBI patients. The aim is to establish a more routine sleep pattern (Sidebar 1).

Consider Daily Supplements
Magnesium, zinc, melatonin

Do sleep disturbances persist?

Yes

Is there a suspicion of sleep-related breathing disorders, nocturnal seizures, periodic limb movements, or narcolepsy?

Yes

Refer for sleep specialist consultation (ideally one with experience with mTBI and polysomnography).

No

No

Non-Pharmacological Treatment

Cognitive Behaviour Therapy (CBT)
The treatment of choice for either primary insomnia or insomnia co-morbid to a medical or psychiatric condition.

Is CBT unavailable to the patient or is the patient waiting for CBT treatment?

Yes

Behavioural recommendations of sleep restrictions and stimulus control can be implemented with weekly monitoring of the patient for the first few weeks (Appendix 7.5).

No

Was CBT successful?

Yes

No

Other Treatment Options
Acupuncture, exercise, mindfulness-based stress reduction.

Continue to treat and monitor sleep/wake disturbances. Refer for sleep specialist consultation (ideally one with experience with mTBI and polysomnography) if unable to manage sleep disturbances.